# Aviation Investigation Final Report

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| **Location:** | Grand Meadow, Minnesota | **Accident Number:** | CHI08LA080 |
| **Date & Time:** | February 8, 2008, 13:09 Local | **Registration:** | N3537V |
| **Aircraft:** | Cessna 140 | **Aircraft Damage:** | Substantial |
| **Defining Event:** | VFR encounter with IMC | **Injuries:** | 1 Fatal |
| **Flight Conducted Under:** | Part 91: General aviation - Personal | | |

## Analysis

The airline transport pilot had purchased the vintage airplane earlier in the day and was en route to attend a family event later that afternoon. Track data for the accident flight indicated that the airplane was flying between 300 and 600 feet above ground level (agl) when it encountered a wind farm with several 400-foot-tall wind turbines. The data showed that the airplane made a 90-degree course change, which was followed by a figure-8 turn at varying altitudes between 800 and 1,500 feet agl. The airplane impacted terrain in a nose-low, left-wing-down attitude. The 300-foot-long debris path and fragmentation of the airplane were consistent with a high-speed impact. Examination of the airframe, engine, and propeller revealed no anomalies that could be associated with a preimpact failure or malfunction. The intended route of flight was into an area of extensive instrument weather conditions consisting of low ceilings and reduced visibility. Weather stations near the accident site reported 400- to 600-foot agl overcast ceilings and visibilities of 1-1/2 to 2-1/2 miles in mist. During the accident flight, there were active flight advisories for instrument flight rules (IFR) flight and moderate icing conditions. The pilot had obtained three weather briefings before departing on the accident flight, all of which forecasted that IFR conditions would exist along the planned route. The airplane was not equipped for instrument flight.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's continued visual flight into an area of known instrument meteorological conditions in an airplane not equipped for instrument flight, and his failure to maintain control of the airplane while maneuvering at low altitude.

## Findings

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| **Environmental issues** | Below VFR minima - Decision related to condition |
| **Aircraft** | Instrument flight capability - Incorrect use/operation |
| **Personnel issues** | Weather planning - Pilot |
| **Personnel issues** | Aircraft control - Pilot |
| **Environmental issues** | Tower/antenna (incl guy wires) - Contributed to outcome |

# Factual Information

## History of Flight

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| **Prior to flight** | Preflight or dispatch event |
| **Maneuvering-low-alt flying** | Low altitude operation/event |
| **Maneuvering-low-alt flying** | VFR encounter with IMC (Defining event) |
| **Maneuvering-low-alt flying** | Loss of control in flight |
| **Uncontrolled descent** | Collision with terr/obj (non-CFIT) |

HISTORY OF FLIGHT

On February 8, 2008, at 1309 central standard time (cst), a 1948 Cessna 140, N3537V, piloted by an airline transport pilot, was substantially damaged during an in-flight collision with terrain following a loss of control during cruise flight near Grand Meadow, Minnesota. Instrument meteorological conditions prevailed at the time of the accident. The personal flight was operating under the provisions of 14 Code of Federal Regulations (CFR) Part 91 without a flight plan. The pilot, the sole occupant, was fatally injured. The flight departed New Richmond Regional Airport (KRNH), New Richmond, Wisconsin, about 1211 cst and was enroute to Oskaloosa Municipal Airport (KOOA), Oskaloosa, Iowa.

The pilot had purchased the airplane earlier in the day, and was flying to Fulton, Missouri, to attend a family event later that afternoon. He intended to stop at KOOA to obtain fuel before continuing on to Elton Hensley Memorial Airport (KFTT) near Fulton, Missouri.

The accident flight path was reconstructed using data recovered from a handheld global positioning system (GPS) receiver located in the wreckage and aircraft radar track data. At 1211 cst, the airplane departed from KRNH on runway 14 and proceeded south on a direct course to KOOA. The airplane cruised between 1,600 and 1,900 feet mean sea level (msl). At 1306:48, the airplane made a 90-degree left turn and proceeded east for about 60 seconds before completing a figure-8 turn at varying altitudes between 2,200 and 2,900 feet msl. At 1309:08, the last GPS position was recorded at 2,276 feet msl. The elevation of the accident site was about 1,368 feet msl.

The GPS and radar data was plotted on an aviation sectional chart. The initial 90-degree course change and figure-8 maneuver were performed immediately north and east of several 400-foot tall wind turbines. The ground track for a direct course from KRNH to KOOA passed through this area of wind turbines.

PERSONNEL INFORMATION

According to Federal Aviation Administration (FAA) records, the pilot of N3537V, age 54, held

an airline transport pilot certificate with airplane single and multiengine land, airplane single engine sea, rotorcraft-helicopter, and instrument rotorcraft ratings. The rotorcraft-helicopter and instrument rotorcraft ratings were limited to commercial pilot privileges. The airplane single engine land and sea ratings were limited to private pilot privileges. The pilot also had a flight engineer certificate for turbojet airplanes. He was type-rated for the Boeing 727, Douglas DC-9, McDonnell Douglas MD-11, and Fokker 100. A search of FAA records showed no accident, incident, enforcement or disciplinary actions.

The pilot's last aviation medical examination was completed on September 11, 2007, when he was issued a first-class medical certificate with no limitations or restrictions. At the time of the medical examination, he reported having 21,000 hours of flight experience. The pilot was a captain with a domestic airline. The airline reported his last regulatory checkride was completed on December 23, 2007.

## AIRCRAFT INFORMATION

The accident airplane was a 1948 Cessna 140, serial number (s/n) 14809. The airplane incorporated a metal fuselage and fabric covered wings with metal control surfaces. It was equipped with externally braced wings, wing flaps, and a fixed conventional landing gear. The airplane seated two occupants and had a certified maximum takeoff weight of 1,450 lbs. The airplane was not certified for operation under instrument flight rules (IFR). The airplane was equipped with a turn-and-bank indicator that was powered by a venturi vacuum system, but was not equipped with an artificial horizon or a directional gyro.

The original standard airworthiness certificate was issued on June 2, 1948. The airframe had a total service time of 1,970.6 hours at the time of the accident. The last annual inspection was completed on January 24, 2007, at 1,968.0 hours total service time. The airplane had accumulated 2.6 hours since the inspection. The pilot had purchased the airplane on the morning of the accident. The previous owner reported that the pilot was aware that the annual inspection had lapsed. According to the FAA, the pilot did not obtain a ferry permit for the accident flight.

A Teledyne Continental Motors model C90-12F reciprocating engine, s/n 15311-2-12-R, powered the airplane. The 90-horsepower engine provided thrust through a McCauley model 1A90, fixed pitch, two-blade, metal propeller. The engine had a total service time of 1,075.6 hours at the time of the accident. The last engine maintenance was performed on January 24, 2007, at 1,073.0 hours total time, during the last annual inspection.

A review of the maintenance records found no history of unresolved airworthiness issues.

## METEOROLOGICAL INFORMATION

The National Weather Service (NWS) Surface Analysis Chart for 1200 cst depicted a low pressure center over northern Iowa and an associated occluded front approaching the

accident site. The NWS Weather Depiction Charts for 1000 cst and 1300 cst depicted an extensive area of IFR weather conditions along and ahead of the low pressure center and the associated occluded front. The departure airport and accident site were located northeast of the low pressure center and occluded front. Surface observations taken along the route of flight reported IFR conditions due to low ceilings and visibility restrictions in light snow, mist, or haze.

The departure airport (KRNH) was equipped with an automated weather observing system (AWOS) that reported the following weather conditions surrounding the departure time:

At 1135 cst: Wind 120 degrees true at 4 knots; visibility 1-1/4 statute miles (sm) in light snow; sky overcast at 1,500 feet above ground level (agl); temperature -5 degrees Celsius; dew point -7 degrees Celsius; altimeter setting 29.72 inches of mercury.
At 1235 cst: Wind 110 degrees true at 5 knots; visibility 1-1/4 sm in light snow; sky overcast at 1,500 feet agl; temperature -5 degrees Celsius; dew point -7 degrees Celsius; altimeter setting 29.72 inches of mercury.

The closest weather reporting facility to the accident site was at the Austin Municipal Airport (KAUM), about 14.5 nm west of the accident site. The airport was equipped with an automated weather observing system. The local weather conditions were continually broadcast and accessible using an aviation radio. The following weather conditions were reported by the AUM AWOS:

At 1256 cst: Wind 140 degrees true at 4 knots; visibility 1-1/2 sm with mist; sky overcast at 400 feet agl; temperature -3 degrees Celsius; dew point -4 degrees Celsius; altimeter setting 29.63 inches of mercury.

At 1316 cst: Wind 140 degrees true at 6 knots; visibility 1-1/2 sm with mist; sky overcast at 400 feet agl; temperature -3 degrees Celsius; dew point -4 degrees Celsius; altimeter setting 29.63 inches of mercury.

The next closest weather reporting facility was at Rochester International Airport (KRST), about 15 nm north-northeast of the accident site. The airport was equipped with an automated surface observing system (ASOS). The local weather conditions were continually broadcast and accessible on an Airport Terminal Information Service (ATIS) frequency. The following weather conditions were reported by the RST ASOS:

At 1254 cst: Wind 130 degrees true at 9 knots; visibility 2-1/2 sm with mist; sky overcast at 600 feet agl; temperature -3 degrees Celsius; dew point -5 degrees Celsius; altimeter setting 29.64 inches of mercury. The surface visibility was 3 sm.

At 1308 cst: Wind 120 degrees true at 8 knots; visibility 3 sm with mist; sky overcast at 600 feet agl; temperature -3 degrees Celsius; dew point -5 degrees Celsius; altimeter setting 29.64 inches of mercury. The surface visibility was 3 sm.

Satellite infrared imagery depicted extensive layer of low stratiform clouds over the route of flight and accident site, with cloud tops in the range of 7,000 feet msl. Satellite visible imagery depicted a low overcast layer of stratus to nimbostratus clouds over the route of flight and the accident site.

The Terminal Aerodrome Forecasts (TAF) at the departure airport and airports along the route of flight forecasted IFR conditions with low ceilings and visibilities at the time of departure and during the accident flight.

During the accident flight, there was an active advisory for IFR conditions across Wisconsin, Minnesota, and northern Iowa. The advisory warned of ceilings below 1,000 feet agl and/or visibility below 3 sm in precipitation. There was also an active advisory for moderate icing conditions below 8,000 feet msl and a freezing level at the surface. The NWS Current Icing Product indicated a 70 percent probability of icing conditions at 2,000 feet msl.

The pilot accessed the FAA Direct Users Access Terminal (DUAT) and obtained three weather briefings before departing on the accident flight. The evening before the accident, he obtained outlook and route briefings. On the morning of the accident, at 0426 cst, he obtained a low altitude weather briefing for the intended route of flight. All of the obtained weather briefings forecasted that IFR conditions would exist along the planned route.

## COMMUNICATIONS

The pilot did not communicate with air traffic control (ATC) during the accident flight, nor did he file or open any form of a flight plan.

## WRECKAGE AND IMPACT INFORMATION

The accident site was located in a level, snow covered field. The airplane impacted in a nose-low, left-wing-down attitude. The debris path, from the initial impact to the main wreckage, was approximately 300 feet long and was oriented on a 210-degree magnetic bearing. There were numerous 400-foot tall wind turbines to the south and west of the accident site. The closest wind turbine was located about 300 feet south of the main wreckage. There was no evidence that the airplane impacted any of the wind turbines during the accident flight.

The main wreckage consisted of the entire fuselage structure, empennage, right and left wings, and engine. The main cabin and aft fuselage was highly fragmented. There was no evidence of a fire. All flight control surfaces were accounted for at the accident site. Flight control cable continuity was established from each flight control surface to the cockpit. The flaps were fully retracted. There were areas of snow under the main wreckage that were stained a blue color, consistent with 100 low-lead aviation fuel. The fuel selector was positioned to draw fuel from both fuel tanks. The altimeter's Kollsman window was set to 29.76 inches of mercury.

The engine remained partially attached to the airframe. The propeller had separated from the crankshaft and both blades exhibited blade twist, spanwise bending, and chordwise scratching. The magnetos produced spark to all four wires when spun with the impulse coupling. The muffler heat shrouds were opened and contained no evidence of exhaust leakage.

Examination of the airframe, engine and propeller did not reveal any anomalies associated with a pre-impact failure or malfunction.

MEDICAL AND PATHOLOGICAL INFORMATION

On February 11, 2008, an autopsy was performed on the pilot at the Mayo Clinic in Rochester, Minnesota. The pilot's cause of death was attributed to multiple blunt force injuries sustained during the accident.

The FAA's Civil Aeromedical Institute in Oklahoma City, Oklahoma, performed toxicology tests on the pilot. No carbon monoxide or cyanide was detected in blood and no ethanol was detected in vitreous. Diphenhydramine was present in urine, but not detected in blood. Ibuprofen was detected in urine.

Diphenhydramine is an over-the-counter antihistamine with sedative effects, most commonly used to treat allergy symptoms, severe nausea, and itching. Ibuprofen is an over-the-counter anti-inflammatory drug used to treat the symptoms of arthritis, primary dysmenorrhea, fever, and as an analgesic.

## Pilot Information

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| **Certificate:** | Airline transport; Flight engineer | **Age:** | 54,Male |
| **Airplane Rating(s):** | Single-engine land; Single-engine sea; Multi-engine land | **Seat Occupied:** | Left |
| **Other Aircraft Rating(s):** | Helicopter | **Restraint Used:** | |
| **Instrument Rating(s):** | Airplane; Helicopter | **Second Pilot Present:** | No |
| **Instructor Rating(s):** | None | **Toxicology Performed:** | Yes |
| **Medical Certification:** | Class 1 Without waivers/limitations | **Last FAA Medical Exam:** | September 11, 2007 |
| **Occupational Pilot:** | Yes | **Last Flight Review or Equivalent:** | December 23, 2007 |
| **Flight Time:** | 21000 hours (Total, all aircraft) | | |

## Aircraft and Owner/Operator Information

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| **Aircraft Make:** | Cessna | **Registration:** | N3537V |
| **Model/Series:** | 140 | **Aircraft Category:** | Airplane |
| **Year of Manufacture:** | | **Amateur Built:** | |
| **Airworthiness Certificate:** | Normal | **Serial Number:** | 14809 |
| **Landing Gear Type:** | Tailwheel | **Seats:** | 2 |
| **Date/Type of Last Inspection:** | January 24, 2007 Annual | **Certified Max Gross Wt.:** | 1450 lbs |
| **Time Since Last Inspection:** | 2.6 Hrs | **Engines:** | 1 Reciprocating |
| **Airframe Total Time:** | 1970.6 Hrs as of last inspection | **Engine Manufacturer:** | Teledyne Continental Motor |
| **ELT:** | Installed | **Engine Model/Series:** | C90-12F |
| **Registered Owner:** | On file | **Rated Power:** | 90 Horsepower |
| **Operator:** | On file | **Operating Certificate(s) Held:** | None |

## Meteorological Information and Flight Plan

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| **Conditions at Accident Site:** | Instrument (IMC) | **Condition of Light:** | Day |
| **Observation Facility, Elevation:** | KAUM,1234 ft msl | **Distance from Accident Site:** | 14 Nautical Miles |
| **Observation Time:** | 13:16 Local | **Direction from Accident Site:** | 270° |
| **Lowest Cloud Condition:** | | **Visibility** | 1.5 miles |
| **Lowest Ceiling:** | Overcast / 400 ft AGL | **Visibility (RVR):** | |
| **Wind Speed/Gusts:** | 6 knots / | **Turbulence Type Forecast/Actual:** | / |
| **Wind Direction:** | 140° | **Turbulence Severity Forecast/Actual:** | / |
| **Altimeter Setting:** | 29.62 inches Hg | **Temperature/Dew Point:** | -3°C / -4°C |
| **Precipitation and Obscuration:** | Light - None - Mist | | |
| **Departure Point:** | New Richmond, WI (KRNH) | **Type of Flight Plan Filed:** | None |
| **Destination:** | Oskaloosa, IA (KOOA) | **Type of Clearance:** | None |
| **Departure Time:** | 12:11 Local | **Type of Airspace:** | Class G |

## Wreckage and Impact Information

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| **Crew Injuries:** | 1 Fatal | **Aircraft Damage:** | Substantial |
| **Passenger Injuries:** | N/A | **Aircraft Fire:** | None |
| **Ground Injuries:** | N/A | **Aircraft Explosion:** | None |
| **Total Injuries:** | 1 Fatal | **Latitude, Longitude:** | 43.669723,-92.605003 |

## Administrative Information

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| **Investigator In Charge (IIC):** | Fox, Andrew |
| **Additional Participating Persons:** | Richard D Zellner; Federal Aviation Administration - Minneapolis FSDO; Minneapolis, MN |
| **Original Publish Date:** | April 15, 2009 |
| **Last Revision Date:** | |
| **Investigation Class:** | Class |
| **Note:** | |
| **Investigation Docket:** | https://data.ntsb.gov/Docket?ProjectID=67563 |